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(58) Documents Cited  
EP 0492328 A1 WO 92/03110 A1 US 4287885 A  
US 3945046 A

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## (54) Knee support

(57) A knee support for relieving pain in arthritic knee joints comprises an elastic support sleeve 10 adapted to engage snugly around a wearer's knee at, above and below the wearer's knee joint and without applying any direct pressure to the patella of that joint. An arcuate pressure pad 20 secured to the sleeve is disposed so as to lie alongside, but not overlap, the lower and outward peripheral parts of the patella. An arc-shaped adjustable strap 22 is secured at its respective end portions externally on the sleeve in such manner as to provide for the patella an adjustable, pain-alleviating force which is directed both upwardly and inwardly towards the wearer's other knee, thereby to alleviate pain in the knee joint. The force is adjustable by adjustment of the tension in the strap.

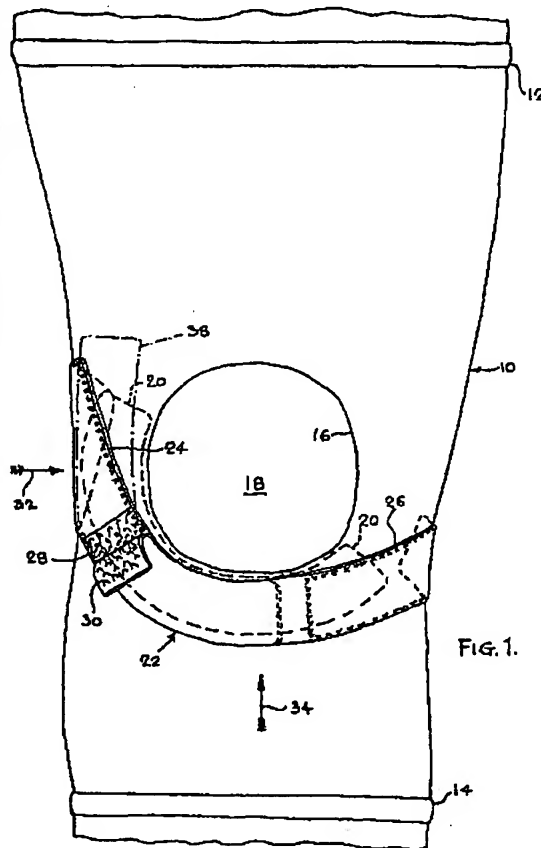


FIG. 1.

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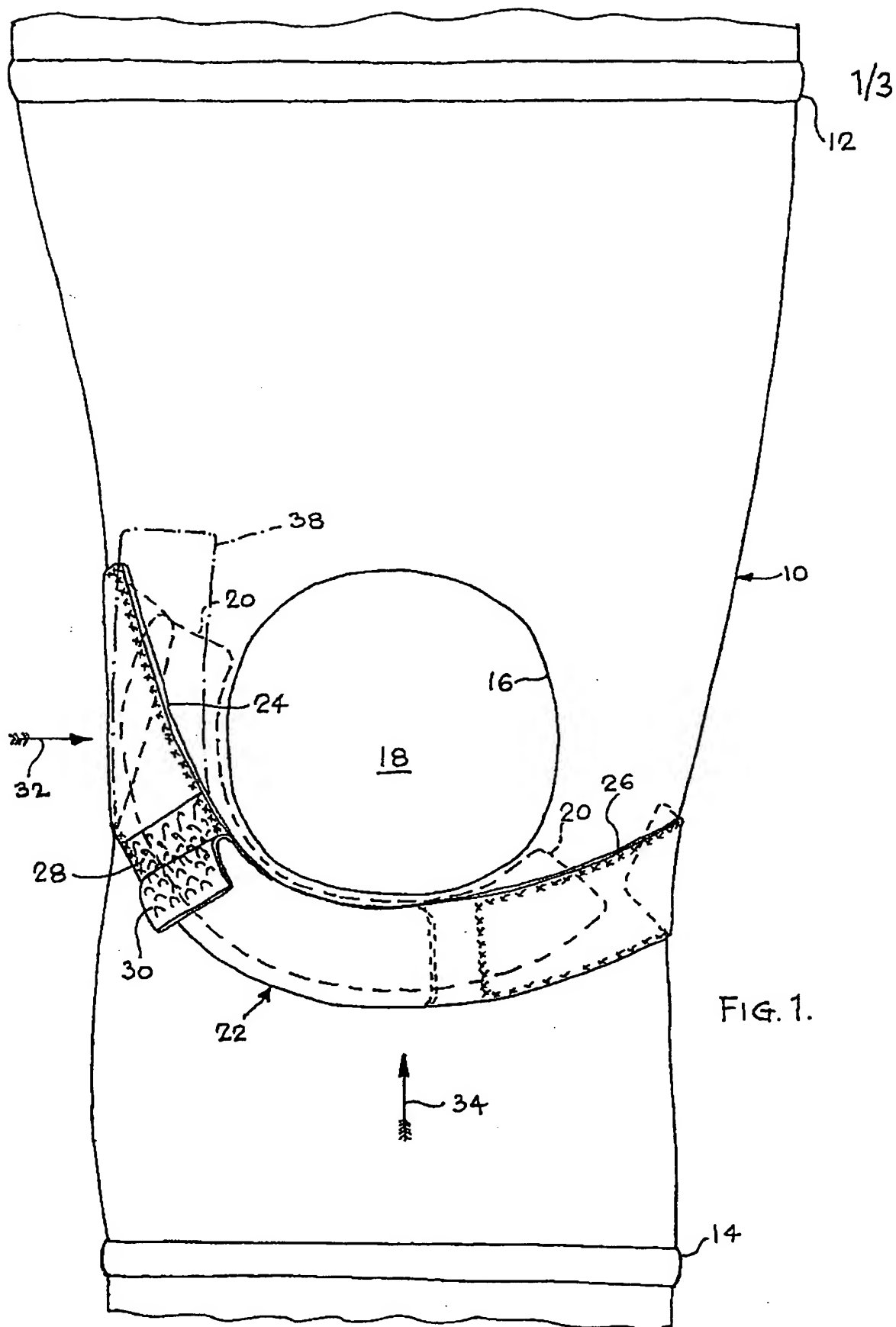


FIG. 1.

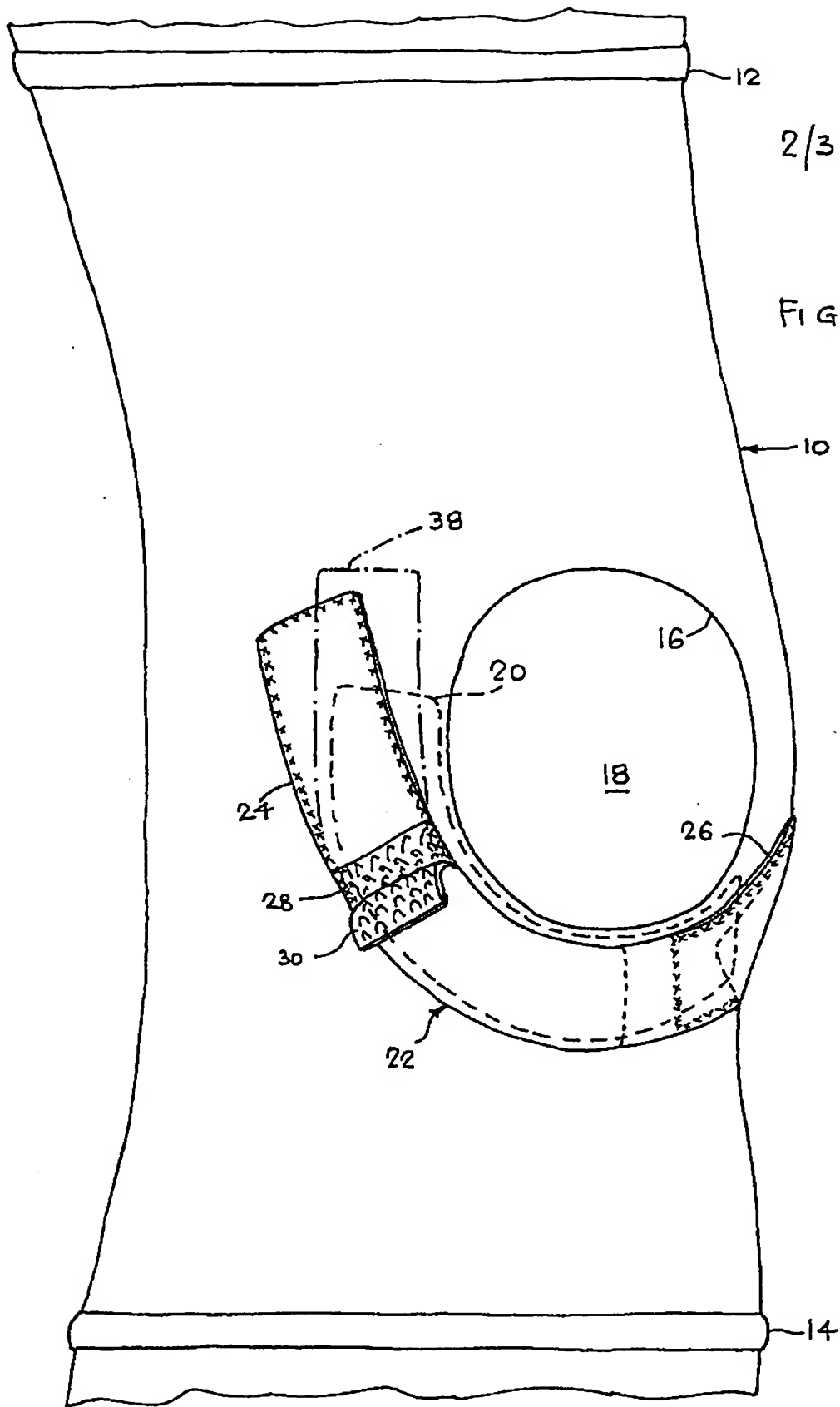
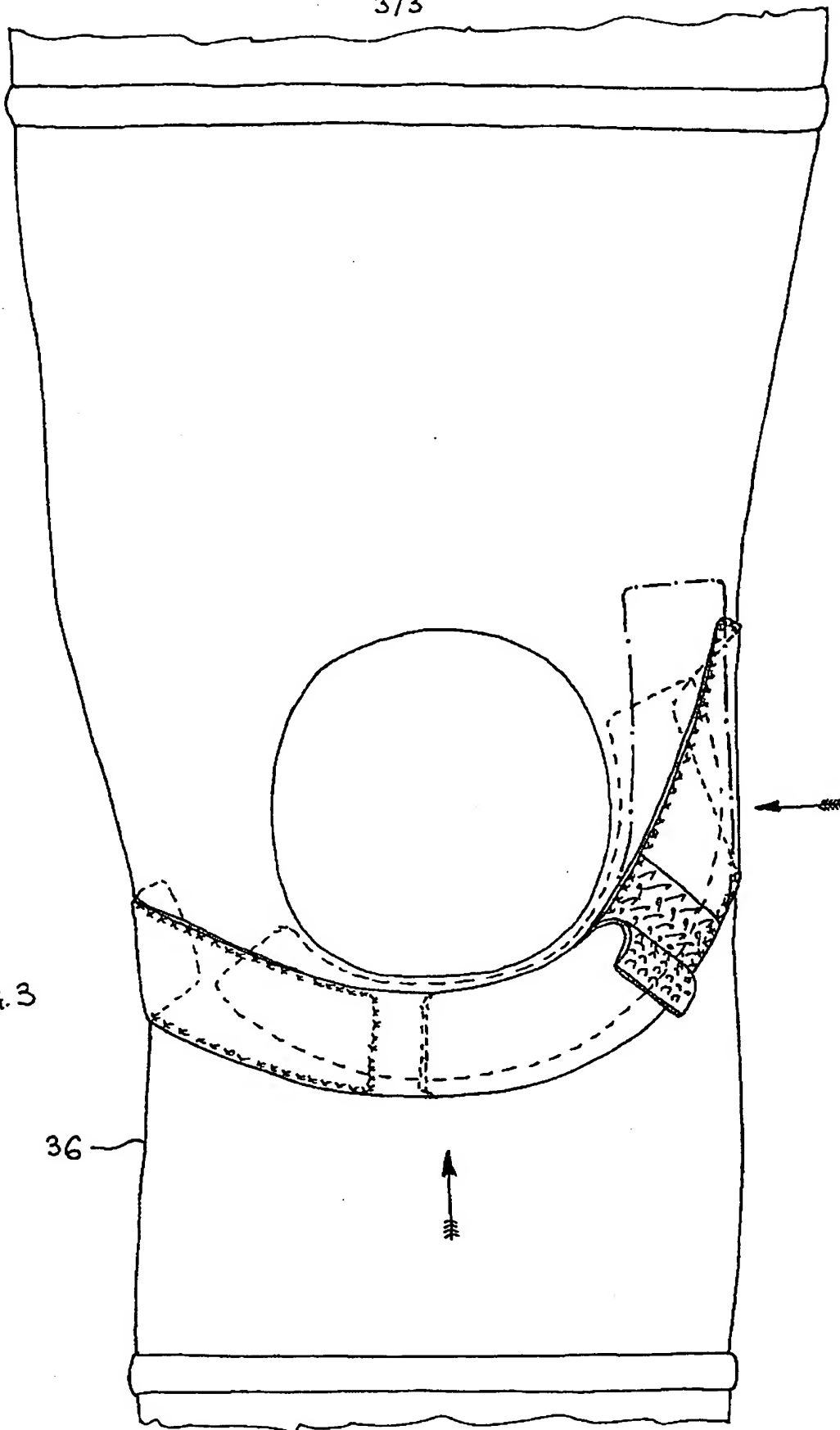


FIG. 3

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**KNEE SUPPORT**

5 This invention relates to a knee support for alleviating,  
in particular, arthritic pain.

Human knee joints frequently suffer injury, often as a  
result of sporting activity, but also as a result of the  
onset of arthritis, particularly in older people.

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Many sorts of knee support are available commercially, each  
being constructed to give support in a manner appropriate  
to a particular form of injury.

15 Knee supports commonly comprise an elastic sleeve shaped to  
closely engage around and apply radial pressure to the  
respective higher, medial and lower parts of the knee  
joint. Some such sleeves have pressure pads secured  
thereon, externally or internally, the pads being shaped to  
20 apply pressure directly to the patella. Other sleeves have  
an aperture so as not to completely cover up the patella.  
The pressure pads are frequently in the form of a ring  
which engages the peripheral parts of the patella, whilst  
other pressure pads are in the form of a circular arc.  
25 Such arcuate pads may be positioned to apply pressure to  
the patella at specific positions thereon.

It has been recognised recently that in respect of  
arthritic knee joints the following two factors alleviate  
30 significantly the pain of the sufferer:

(a) the patella should be free of direct pressure, i.e.  
pressure directed transversely of the plane of the patella  
(that is - pressing into the knee joint); and

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(b) the joint benefits in a pain-relieving sense from the  
application to the patella in a substantially edgewise  
manner of a force which is directed both upwardly and in a

direction towards the knee joint of the adjacent leg of the sufferer.

5 In this specification, references to positions and directions are references to positions and directions relative to the wearer of a knee support when the wearer is standing in an upright stance. Moreover, references to 'inwards', 'inwardly', etc are references to positions adjacent to or directions pointing towards the knee joint  
10 of the wearer's adjacent leg.

According to one feature of the present invention, a knee support comprises an elastic support sleeve for engaging snugly around the upper, medial and lower portions of a  
15 wearer's arthritic knee joint without applying any substantial direct pressure to the wearer's patella, an arcuate pressure pad secured to the sleeve (preferably internally of the sleeve), which pad is disposed so as to lie substantially contiguously with, but not overlapping,  
20 the lower and outward peripheral parts of the wearer's patella, and an arc-shaped adjustable strap secured at its respective end portions externally on the sleeve in such manner and at such position as to provide for the wearer's patella an adjustable force which is directed in a  
25 substantially edgewise manner both upwardly and inwardly thereby to alleviate pain in the wearer's arthritic knee joint.

The sleeve may be provided with an aperture through which  
30 the patella may protrude, or a relieved portion which covers but avoids the application of direct pressure to the patella.

With knee support sleeves according to the present  
35 invention, the magnitude of the pain-relieving force may be adjusted by adjusting the strap thereby to adjust the tension in the respective parts of the adjustable strap.

Preferably, the pain relieving force is transmitted to the wearer's patella through the peripheral arcuate pressure pad.

5 In one convenient form, the adjustable strap comprises two separate portions secured on the sleeve at spaced positions, and having respectively thereon respective hook and loop materials (such as those commercially available under the trade name VELCRO) of the kind that may be  
10 releasably connected together by a simple finger pressure sufficient to engage the hooks and loops of the respective materials.

The sleeve may be made of an elasticated woven material, or  
15 of a sheet rubber material, such as for example, silicone rubber or neoprene.

Other features of the present invention will appear from a reading of the description that follows hereafter, and of  
20 the claims that are appended at the end of that description.

One knee support, and various modifications thereof, all according to the present invention will now be described by  
25 way of example and with reference to the accompanying diagrammatic drawings. In those drawings:

Figure 1 shows pictorially a front view of the knee support as worn on the right hand knee joint of a wearer;  
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Figure 2 shows a partly sideways view of the knee support and knee of Figure 1, as seen from a position disposed on the side of the right knee remote from the wearer's left knee, and slightly below the view point of Figure 1; and  
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Figure 3 shows in a view similar to that of Figure 1 the complementary knee support worn on the wearer's left knee joint.

Referring now to the Figures 1 and 2, the knee support shown there comprises an elasticated woven sleeve 10 which snugly engages the upper, medial and lower parts of the wearer's right hand knee joint and which has integral upper and lower reinforced edge portions 12, 14. The sleeve has formed therein a circular aperture 16 through which the wearer's patella 18 protrudes. The woven material of the sleeve may comprise, if desired, textile fibres impregnated (in known manner) with copper compounds, so as to improve the blood circulation in the knee joint and the surface temperature of the knee. As an alternative to woven material, the sleeve may be made of a sheet rubber material such as, for example, silicone rubber or neoprene.

An arc-shaped pressure pad 20 (of an elastomeric material, such as sponge rubber, silicone rubber or neoprene) is secured internally in the sleeve 10 and extends in the manner shown around the lower and outward (in the sense of being remote from the wearer's left leg) peripheral portions of the patella 18 so as not to exert any direct pressure on the patella.

An arc-shaped adjustable strap 22 comprising two independent portions 24, 26 is disposed externally on the sleeve 10, and generally follows the shape of the arc-shaped pressure pad 20. The arc-shaped strap portion 24 is secured along the whole of its length to the sleeve 10, and has at its inward end an adjustment section carrying a multi-hooked material 28 such as that available under the trade name VELCRO. The other arc-shaped strap portion 26 has its inward end part secured to the inward side of the sleeve 10, and its free outward part carries a multi-looped material 30 (likewise available under the trade name VELCRO) which is complementary to the multi-hooked material 28 and which faces that hooked material, so that the hooked and looped materials may be releasably united by mere finger pressure in well known manner. For clarity of illustration, the free outward end part of the strap



portion 26 is shown turned back upon itself from the position it would normally occupy when in use.

5 The strap portions 24, 26 may be secured to the sleeve 10 in any convenient manner, for example by stitching (as shown in the figures) or by fusing, and are preferably of a substantially inextensible material, though if desired they may be of an extensible material, or partly of an inextensible material and partly of an extensible material.

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Any other form of adjustable strap may be used instead, providing the desired pain-relieving effect is achieved. For example, it may be replaced by a two-piece strap having the remote ends of the respective pieces secured to the sleeve and the respective free ends of the two pieces  
15 adjustably coupled by a buckle.

It will be appreciated that the wearer will normally release the adjustable strap to its maximum extent to  
20 facilitate placing of the support about his knee. Thereafter, the wearer will adjust the strap to provide therein a tension sufficient to provide the desired pain-relieving effect of the knee support.

25 The roles of the two strap portions 24,26 may be reversed if desired so that the inward strap portion 26 is secured along the whole of its length to the sleeve, whilst the outward strap portion 24 has its inward end free for drawing over and adjustably securing on the inward strap  
30 portion 26.

In Figure 1, the arrows 32 and 34 indicate the directions in which it is desirable to apply edgewise pressure to the patella.

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Figure 2 further shows the positioning of the inner pressure pad 20 and the adjustable strap portions 24,26 on the woven sleeve 10.

Figure 3 shows in a self-explanatory manner the construction of the complementary knee support 36 worn on the left leg of the wearer.

- 5     The knee support may be modified, if desired, to secure the fixed upper end of the strap portion 24 to the sleeve 10 at an alternative position, such as for example, that indicated in chain-dotted form at reference 38.
- 10    Some minor experimentation may be necessary to determine for a particular wearer the most effective positions at which to secure the fixed ends of the respective strap portions 24, 26 to the sleeve 10, and even the precise shapes of those respective strap portions. However, the
- 15    principle remains the same - namely that the design of the knee support should be such as to avoid direct pressure on the wearer's patella, and provide for the wearer's patella an adjustable force which is directed in a substantially
- 20    edgewise manner both upwardly and inwardly thereby to alleviate pain in the wearer's arthritic knee joint.

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CLAIMS

1. A knee support comprising an elastic support sleeve adapted to engage when in use snugly around a wearer's knee  
5 at, above and below the wearer's knee joint and without applying any substantial direct pressure to the patella of that joint, an arcuate pressure pad secured to the sleeve which pad is disposed so as when in use to lie substantially contiguously with, but not overlap, the  
10 respective lower and outward peripheral parts of the patella, which outward parts lie remote from the wearer's other knee, and an arc-shaped adjustable strap secured at its respective end portions externally on the sleeve in such manner and at such position as to provide for the  
15 patella an adjustable, pain-alleviating force which is directed in a substantially edgewise manner relative to the patella both upwardly and inwardly towards the wearer's other knee thereby to alleviate pain in the wearer's knee joint, which pain-alleviating force is adjustable by  
20 adjustment of the tension in the adjustable strap.
2. A knee support according to claim 1, wherein the sleeve is provided with an aperture through which the  
25 patella may protrude.
3. A knee support according to claim 1, wherein the sleeve is provided with a relieved portion which covers but avoids the application of direct pressure to the patella.
- 30 4. A knee support according to any preceding claim, wherein the pain-alleviating force is transmitted to the wearer's patella through the peripheral arcuate pressure pad.
- 35 5. A knee support according to any preceding claim, wherein the adjustable strap comprises two separate portions secured on the sleeve at respective spaced positions, and having respectively thereon respective hook

and loop materials of the kind that may be releasably connected together by a simple finger pressure sufficient to engage the hooks and loops of the respective materials.

5     6.   A knee support according to any preceding claim,  
wherein the arcuate pressure pad is disposed internally of  
the sleeve.

10    7.   A knee support according to any preceding claim,  
wherein the sleeve is made of an elasticated woven  
material.

15    8.   A knee support according to any one of the claims 1 to  
6, wherein the sleeve is made of a sheet rubber material.

9.   A knee support according to any preceding claim,  
wherein the sleeve material incorporates copper compounds.

20    10. A knee support substantially as hereinbefore described  
with reference to and as illustrated by the accompanying  
diagrammatic drawings.

25    11. A knee support comprising any novel and inventive  
combination of features disclosed in the present  
specification, other than a combination as defined in any  
one of the preceding claims.

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13:cl-mat31

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**Relevant Technical Fields**

- (i) UK CI (Ed.M) A5R (RBE, RBQ, RFB)  
(ii) Int CI (Ed.5) A61F 5/01; 13/06; 13/08

**Databases (see below)**

- (i) UK Patent Office collections of GB, EP, WO and US patent specifications.

(ii)

Search Examiner  
MR N FRANKLIN

Date of completion of Search  
23 SEPTEMBER 1994

Documents considered relevant  
following a search in respect of  
Claims :-  
1 TO 10

**Categories of documents**

- X: Document indicating lack of novelty or of inventive step. P: Document published on or after the declared priority date but before the filing date of the present application.  
Y: Document indicating lack of inventive step if combined with one or more other documents of the same category. E: Patent document published on or after, but with priority date earlier than, the filing date of the present application.  
A: Document indicating technological background and/or state of the art. &: Member of the same patent family; corresponding document.

Category	Identity of document and relevant passages	Relevant to claim(s)
X	EP 0492328 A1 (FERD. HAUBER) note Figure 1	1, 4 to 7
X	WO 92/03110 A1 (MINNESOTA) note Figure 2a	1, 2, 4, 6, 7
A	US 4287885 (SURGICAL APPLIANCE) note Figures 1, 2	
X	US 3945046 (STROMGREN) note for example Figure 2	1, 5, 7

Databases: The UK Patent Office database comprises classified collections of GB, EP, WO and US patent specifications as outlined periodically in the Official Journal (Patents). The on-line databases considered for search are also listed periodically in the Official Journal (Patents).